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WAPITI – AMERICAN ELK and EUROPEAN RED DEER

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WAPITI–AMERICAN ELK

and

EUROPEAN RED DEER

by

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and

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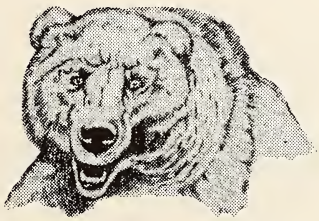

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The personnel of several libraries graciously assisted us many times by obtaining rare books and periodicals that contained information on wapiti.

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CONTENTS

	Page
Introduction	1
Index by Author for Wapiti-American Elk	10
Index by Author for European Red Deer	98
Abbreviations of Reference Sources	122
Index by Subject	136

ILLUSTRATIONS

COVER: A mature bull elk (wapiti) from the Sun River herd in Montana. (Photo by Robert F. Cooney)

Figure	Page
1. The elkhorn pyramid on the upper Missouri	9
2. Elk cows in Yellowstone National Park during early May	21
3. The thrifty appearance of this lactating cow elk	35
4. A small band of foraging elk in a mountain meadow	47
5. A yearling bull elk along the Yellowstone River	58
6. A spiker (yearling) red deer in New Zealand	59
7. A raghorn bull elk in Yellowstone National Park	72
8. A young red deer stag	73
9. Foraging bull elk	84
10. A typical red deer stag on the Isle of Rhum in Scotland	85
11. Bull elk with harem	96
12. In New Zealand, a mature red deer stag	97
13. The elk (wapiti) breeding season in North America	120
14. In New Zealand, red deer fawns	121
15. A young stag and hind red deer	134
16. A group of red deer	135
17. Map of Lewis and Clark expeditions with indicated locations of "Elkhorn Monuments."	146-147

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INTRODUCTION

Wildlife research is no longer confined to the country of its origin. In recent years the publication of various and allied information on wildlife is finding world-wide dissemination. Internationally, the common name of elk exists for two distinct big game species — *Alces* and *Cervus canadensis*. The designation of elk was first established for the European *Alces* which is commonly known as the moose in North America.

The earliest printed use of the word 'Olkes' or 'Elk' with reference to the American animal was made by Captain Geo. Waymouth. During his voyage to Virginia in 1605 he found, "Deere, red and fallow, Beares, etc. --- which we take to be Olkes or Loshes ---" (Seton 1909:41).

Barton (1806) established the name of wapiti when he wrote:

> "As the elk has not to my knowledge been described by any systematic writer on zoology, I have assumed the liberty of giving it a specific name. I have called it *Wapiti* which is the name by which it is known among the Shawnese or Shawnees Indians.--- This animal is generally known in Pennsylvania and in other parts of the United States by the name of elk."

As Murie (1951:3) reviewed the origin of the American wapiti and the American form of elk he encountered dual usage of these common names of which he noted:

> "Ordinarily a change in nomenclature could readily be accepted as permanent, but in this instance there are complications. In scientific usage, especially in publications dealing with world distribution, the name "wapiti" designates a large group of animals of the genus *Cervus,* of which our American forms are only a part. Even in more popular writings "wapiti" is often used in preference to "elk." In Asia are to be found a large group of species of the genus *Cervus,* some of which differ little from our American "elk." European writers refer to this group as "wapiti" because they cannot use the word "elk," already applied to the European *Alces* (Brooks 1910).

Thus it appears best to recognize both names, "elk" which is already in general usage in America, and "wapiti," which is often used in written accounts and which is preferable when writing on aspects of international significance."

WAPITI AND RED DEER

An early account established the close relationship of North American wapiti (elk), Asiatic wapiti (maral) and red deer when Caton (1877) and Winans (1913) reported the interbreeding among these groups and their progeny prove as fertile as either of the parents. Gray (1954) records breeding between these species. Caton (*op. cit.*) suggested that the red deer and wapiti are the same, *Cervus elaphus*. It appears that these observations were made from confined animals.

Anderson (1965) reports that in free roaming populations in New Zealand many wapiti have been shot and mistakenly classified as red deer, particularly in the younger age group. He further noted that three yearling *(wapiti or red deer)* cows culled from a herd revealed upon examination that two were sterile antlerless males (not hummels, page 59). In other culling trips Anderson (*op. cit.*) found at least two additional animals with the same status.

Some mammalogists of today believe that: *Cervus canadensis* and *Cervus elaphus* are similar; various Central and Asian *Cervus* are very similar to *Cervus canadensis;* all *Cervus* form a single Holarctic super-species; and both old and new world populations should be placed in *Cervus elaphus* (Hoffmann and Pattie 1968:67). The ease of interbreeding and the extensive morphological intergradation of recent wapiti subgroups strongly indicate that multispecific status is unwarranted (Guthrie 1966).

It is doubtful that the classification and proper usage of common names will become completely established but these clarifications may be helpful in future studies of these international species.

FOSSIL ELK

Several fossils of extinct species of the genus *Cervus* have been discovered. One of the earliest was found in Kentucky and

is described by Dr. C. Wistar as a fossil elk, *Cervus americanus* (Harlan 1825, Godman 1826). Murie (1951) describes other fossil elk forms found in Wisconsin, Alaska, New Mexico and California. A population of wapiti existed in the northern part of North America during the Wisconsin glaciation (Hopkins 1965, Guthrie 1966).

HISTORY OF ELK (WAPITI) IN EASTERN UNITED STATES

The notations written by Jacques Cartier in 1535 are possibly the first recordings by white man of the animal to become known as the elk in North America. He wrote of "great stores of Stages, Deere, Beares, --- " as he ascended the St. Laurence river as far as Montreal (Seon 1909:41).

Donck (1650, 1656) wrote that elk were numerous in the New Netherlands (presently Eastern New York State). Vast herds of elk were found in Carolina and Virginia in 1670 (Lederer 1672). Father Simon LeMoyne observed elk in 1654 in what is now New York State (Thwaites 1899).

Elk were common in North Carolina in the 1730's (Breckell 1737). In 1748 they were being hunted where Philadelphia now stands (Pennant 1785). Apparently they were numerous in the Great Lakes region in 1764 from the number of hides shipped (Pennant 1785). In 1798, Smith described the elk in some detail.

Harland (1825), Cuvier (1827), and Godman (1828) provided early descriptions and natural histories of the elk. A few elk were still found in New York state in the 1840's and one was shot along the Saranac River in 1836 (DeKay 1842). In the vicinity of Chicago elk had almost entirely disappeared by 1837, although a few were seen occasionally (Shelford 1913: 14). Elk were found along the Arkansas River in Kansas in the 1830's (Gregg 1845). Marcy (1866) writes of an elk hunt in the vicinity of Saginaw Bay, Michigan in 1844. In 1851 Kurz (1851:255) reported the decrease of eastern herds.

> "According to Audubon and Bachmann, *Elaphus canadensis* is met with nowadays, in regions east of the Mississippi only in small herds that range a narrow strip in the Allegheny Mountains. - - - Solitary herds of elk are still found also in West Virginia."

DeKay (1842) and Billings (1856) both refer to this animal as *Elaphus canadensis.*

HISTORY OF ELK (WAPITI) IN WESTERN UNITED STATES

Probably the first reference to elk in western United States, including Montana, was by Lewis and Clark, 1804-1805. Thwaites (1905) reports on their expedition in detail. Burroughs (1961) sorted out the natural history in the Journals of Lewis and Clark and has a section devoted exclusively to elk.

In 1846 a herd of 200 elk was observed on Laramie Creek, Wyoming (Parkman 1946). In the fall of 1872 a herd of 1700 elk was reported in the vicinity of Scott's Bluffs, Nebraska (Crawford 1926). Elk were still present in Iowa in the very early 1870's (American Sportsman 1873). During the 1870's sizeable elk kills were rather common along the Upper Yellowstone River, Montana, where hide hunters were quite active (Forest and Stream 1876).

ELKHORN MONUMENTS

At an early date elk were abundant in the plains of Montana. A tower of elk antlers once stood in an area known as the Monumental Elkhorn Prairie which was located about 17 miles down the Missouri river from the mouth of the Judith river. Maximilian of Wied visited the area in 1833 and reported that an "Elkhorn Steeple" was constructed to the size of 18 feet high and 15 feet through the base. DeSmet also observed this monument during the fall of 1846. (Figure 17).

Denig (1854:398) reported a similar mound of elk antlers near the mouth of the Yellowstone River:

> "---there is a mound about 50 miles above the mouth of the Yellowstone on the west side and near the Missouri consisting of an immense pile of elk horns, covering an area of about an acre of ground, and in height about 30 feet. We have frequently inquired of these and the surrounding nations as to its origin, but it was raised previous to the knowledge or even tradi-

tion of any tribe now living in these parts. From the state of decay the horns are in it must be very ancient."

The recently published records of Bradley (1966:349) provides additional information about these monuments:

"The Elkhorn monuments are among the mysteries of the West destined never to be unraveled. They were three in number, situated on Elkhorn Prairie, on the south side of the Missouri river, just below the mouth of Poplar Creek. The largest was about twenty feet high and twelve feet in diameter at the base, tapering gradually to a rounded top; the other two were somewhat smaller, and all stood within a few hundred yards of each other, about two miles from the Missouri. They contained many thousand horns, all evidently shed by living animals. They were first discovered in 1831, and appeared to have been built a good many years, as the horns were somewhat decayed and the superincumbent weight had pressed the base of each mound several inches into the hard prairie soil. Major Culbertson made diligent inquiries concerning them among all the surrounding tribes, Assiniboines, Blackfeet and Crows, but none were in possession even of a tradition concerning their origin. Such a number of horns could only have been gathered by great labor from a vast area, and it seems improbable from the known character of the neighboring Indians that they could have been the architects of the mounds. There is nothing to indicate the purpose of the monuments, which remains wrapped in as deep mystery as their origin. They seem not to have been discovered by Lewis and Clark in 1805 or 1806, but must then have been in existence. A belt of timber partially interposed and they might readily have been overlooked by men toiling at the line of a keel boat or seated upon its low deck. There is but one known monument of a similar form within a radius of hundreds of miles, which is of stone and located near Belly river. Like the Elkhorn mounds, no account of it could be obtained from the surrounding Indians and the builders of all must evidently be sought among another people. The Elkhorn monuments were taken down by the American Fur Company in 1850 and the best horns selected and carried to St.

Louis in the hope that they would find a ready sale among workers in horn, but the speculation was not very remunerative. Had they not been torn down these monuments would have stood for ages, and it is to be regretted that the greed for money has deprived us of these interesting memorials of a possibly extinct people."

ELK LITERATURE

Between 1850 - 1900 there was a great increase of elk literature. Most of this was descriptive, concerned with classification, distribution, the raising of elk, and other types of surveys. The writing during this period is of historical, rather than scientific interest.

In the late 1800's the Yellowstone Elk Herd came into prominence and it has remained so, right up to the present time. There has been a considerable amount written about the Yellowstone elk: much of it in popular publications and in many unpublished reports. In recent years intensive scientific study has been undertaken on the Yellowstone herd and one of the authors of this bibliography conducted several sections of the project. Russell (1933) has given a history of Scientific Investigations in Yellowstone National Park before the present intensive scientific studies. An early elk hunt in the Park (1874) has been recorded by the Earl of Dunraven (1876). His writings have also been edited by Kephart (1917). The bulk of all elk studies from 1900 to the 1930's dealt with the Yellowstone Elk herd.

Some of the first scientific elk studies were concerned with food habits, and several appeared in the 1920's. Lommasson's (1927) "Elk Forage in Montana" and Skinner's (1928) "The Elk Situation" were among the earliest. DeNio (1938) and Young and Robinette (1939) have reported on elk food habits. Numerous big game food habit studies have followed these early works.

After World War II there was a noticeable increase of scientific studies on elk, and many graduate theses dealt with this species. While several of these studies have been pub-

lished, many still remain only as unpublished reports in various libraries.

SOURCES

An excellent source for recent scientific elk studies is the *Journal of Wildlife Management.* Articles on wapiti and elk are also common in other journals, publications and unpublished completion reports by several State Fish and Game Departments and other agencies. Not all state completion reports on elk are included in this bibliography. A valuable book for early day accounts of the elk and red deer can be found in Phillips (1930) catalog of books of American game mammals, 1582-1925.

RED DEER

Several Old Testament references alluding to the "hart" and "hind" refer to deer and it is very likely the red deer *(Cervus elaphus)* (Gen. 49:21; Deut. 12:15, 22; 14:5; 15:22; II Sam. 22:34; Job 39:1; Ps. 18:33; 29.9; 42.1; Song of S. 2:9, 17; 8:14; Isa 35:6; Jer. 14:5; Lam. 1:6; Hab. 3:19) (Buttrick 1962 Vol. II:526, 605). The "hart" can refer to the adult male of red deer and a "hind" the adult females of the red deer, especially after the third year (McCullough Vol. II 1962). "The deers of the Ancient Middle East are the red deer *(Cervus elaphus)*, still common in the Anatolian mountains, (Asia Minor—Modern Turkey)—" (Bodenheimer 1960:49), and this species was known in biblical Palestine (Buttrick 1962 Vol. I: 814). This may be the deer found on King Solomon's table (I Kings 4:22-23) (Bodenheimer 1962 Vol. II:251).

Anyone who studies the wapiti is also familiar with Darling's (1937) classical work, "A Herd of Red Deer." Although the red deer is not native to America it is because the two species are so closely related in taxonomy, biology, and behavior that it would be difficult to compile a bibliography without reference to both. Therefore, a limited section on red deer is also included.

A few red deer were introduced into Kentucky, U. S. A. in 1930 (Vinson 1947). By 1945 they were causing serious problems and a special hunt was set up. About 600 special per-

mits were issued but only 29 of the wary red deer were killed. Not only were the red deer causing damage to farm crops but they were competing with the white-tail deer *(Odocoileus virginianus)* for the available food supply. At that time the red deer were an undesirable addition to Kentucky's wildlife supply. About 66 descendents of this species still remain in Kentucky (Presmall 1958). Apparently red deer have a trait very common to the wapiti; they are quite adaptable and can be competitive with other species.

Lederer (1672), Gray (1836) and Walsh (1892) provided the earliest writings we have in the red deer section. A large portion of the bibliography on red deer are of the late 1950's and the 1960's, and these would generally have more scientific value than those of the 1800's and early 1900's on elk. As expected, our coverage of wapiti is much broader than for red deer. Although many references are cited that only incidentally mention elk, they are included for a distinct historical quality.

This bibliography on wapiti, or American elk *(Cervus canadensis)* and red deer *(Cervus elaphus)* was accumulated in the several years of periodic literature research during our various studies. References include the period from 1535 through December, 1968. An accumulation of over 1,450 references on wapiti (1,210) and red deer (240) should be of value to students, laymen and professionals seeking historical and scientific information on these species. We fully realize that this bibliography is not complete and errors will be found. We would appreciate these being called to our attention. In bringing these references together the authors hope that it will be useful for future wapiti (elk) and red deer studies. It should also be of value to those persons who are looking for historical, general and documented articles on these species.

FIGURE 1. "The elkhorn pyramid on the upper Missouri," is recorded by artist Karl Bodmer in the early 1830's. (Plate 21, Wied 1841). Blemishes in the picture are caused by foxed copy.

Wapiti-American Elk

Anonymous

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FIGURE 2. Elk cows in Yellowstone National Park during early May, are seeking new spring forage following an extended winter period. Pregnant females are within one month of bearing their calves. The cow in the foreground is shedding its winter pelage.

(Yellowstone National Park photo)

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(Photo by Gerry Atwell)

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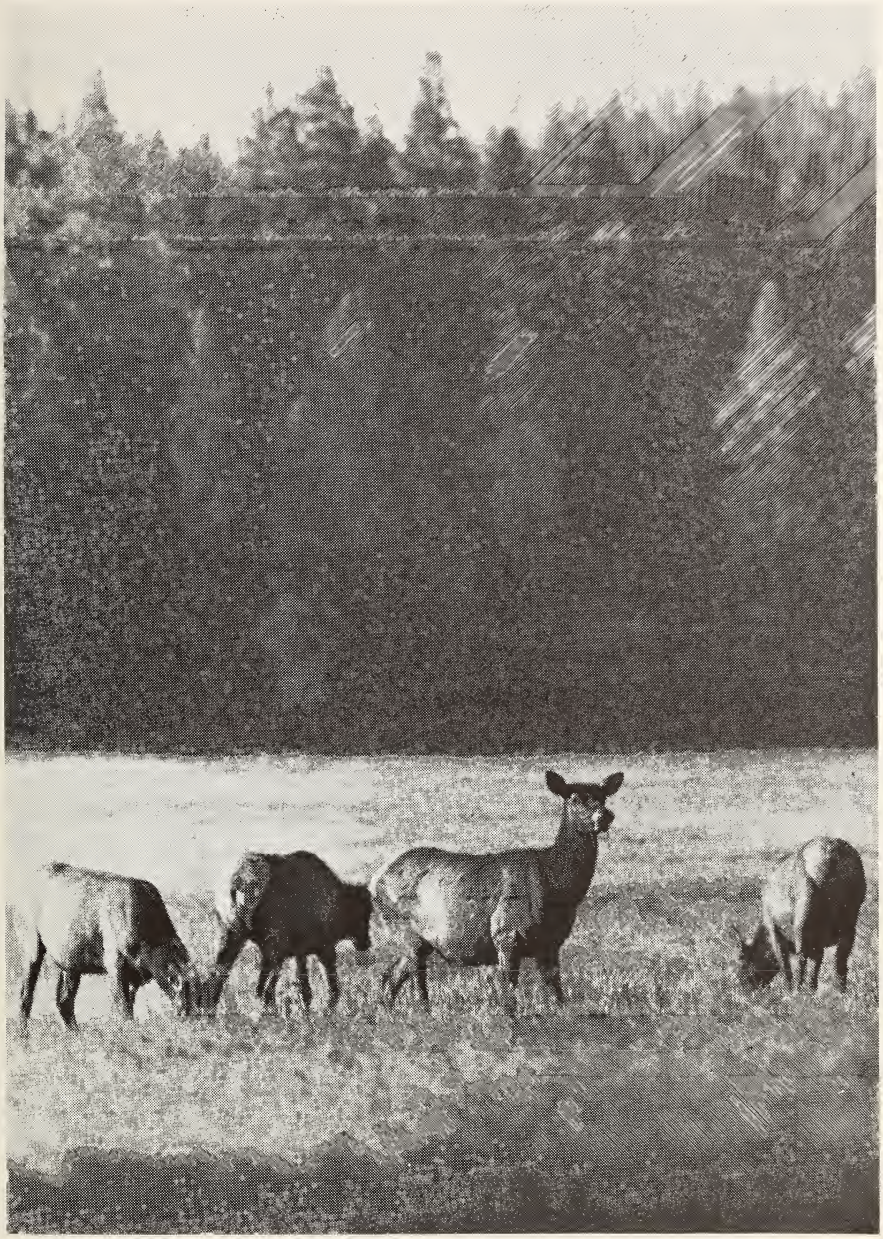

FIGURE 4. A small band of foraging elk in a mountain meadow. Grass and grass-like plants are prominently used throughout the year by the northern Yellowstone elk herd (Greer, Kirsch, and Yeager 1968). During the summer succulent forb type plants are also utilized. Unlike mule deer or white-tailed deer which require an almost complete browse winter diet, elk will utilize either grass or browse plants during the winter. The size of an elk herd is usually limited by the amount of forage consistently available during winter periods. (Photo by Robert F. Cooney)

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FIGURE 5. A yearling bull elk along the Yellowstone River in Montana during January. The first set of antlers begin growth in late May when male elk are about one year of age. Yearling antler development is completed in late August and is usually a simple spike ranging in length from 6 to 25 inches. A small proportion of spike elk in the northern Yellowstone herd retain some velvet. A few have more than one point which are considered branched (Greer 1968). In some herds, however, many yearling antlers have more than one point. Murie (1956) noted that while some yearlings shed their antlers in March, many are retained until April and a few are held into May.

(Photo by R. Rothweiler)

FIGURE 6. A spiker (yearling) red deer in New Zealand. "At two years (beginning the second year) a stag (spiker) will produce his first 'head', usually of two simple prongs only, though under exceptional conditions English and New Zealand two-year-olds have produced prongs with forked tops and even small brow tines. Rarely, stags may never bear antlers, the reason being unknown. Such animals are referred to as hummels, which though antlerless throughout their life are capable of breeding normally." (Harris 1967).

In Scotland and Norway, antlers of yearling stags vary from almost no antler at all (knobbers) to 12 inch spikes and the usual size is 6 to 8 inches. Spurs or branches have not been observed in Scotland (Mitchell, pers. comm.) and rarely in Norway (Wegee, pers. comm.).

(New Zealand Forest Service Photo, J. H. G. Johns, A.R.P.S.)

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FIGURE 7. A raghorn bull elk in Yellowstone National Park during February. The raghorn antlers are the first set of antlers after the spikes are cast off. The patterns of successive antler growth and shedding are greatly modified due to inheritable characteristics, age, physical size, nutrition levels and reproductive status. Mature elk in the northern Yellowstone herd generally shed their antlers in March and regrowth is obvious during early April. Most of the antler growth takes place in May and June with final development and hardening in July. Depending upon the animal's age of young, intermediate or mature, from 4 to 25 pounds of bone tissue is produced annually in a period of about three to four months. Velvet shedding in August precedes breeding activities in September and October. (Photo by R. Rothweiler)

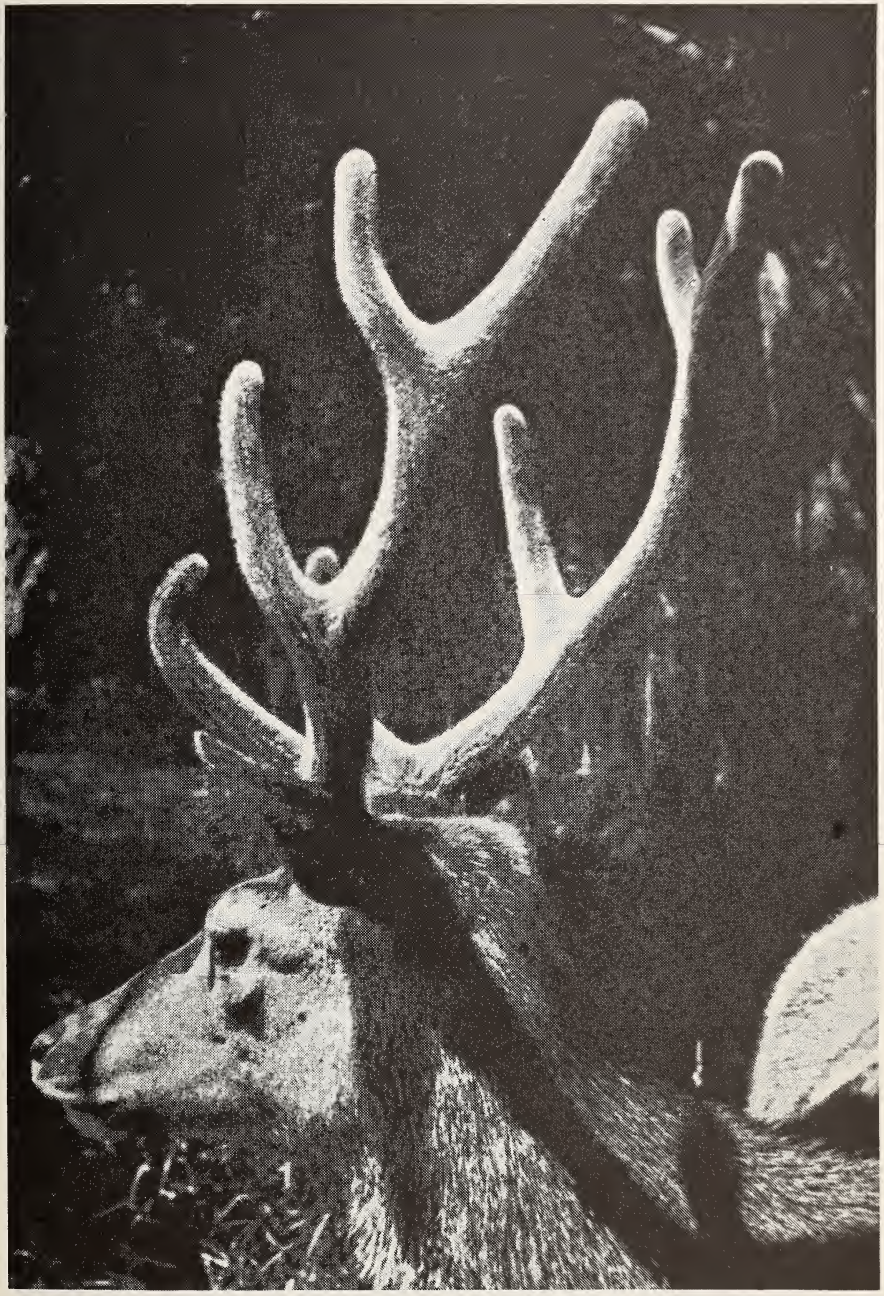

FIGURE 8. A young red deer stag. In New Zealand, red deer cast old antlers in late September and early October. New antler growth is completed during December or January, and the velvet retained into February In Scotland, older stags cast their antlers in April, younger stags in May and new antlers are full grown in August. (Photo by Jack McKenzie)

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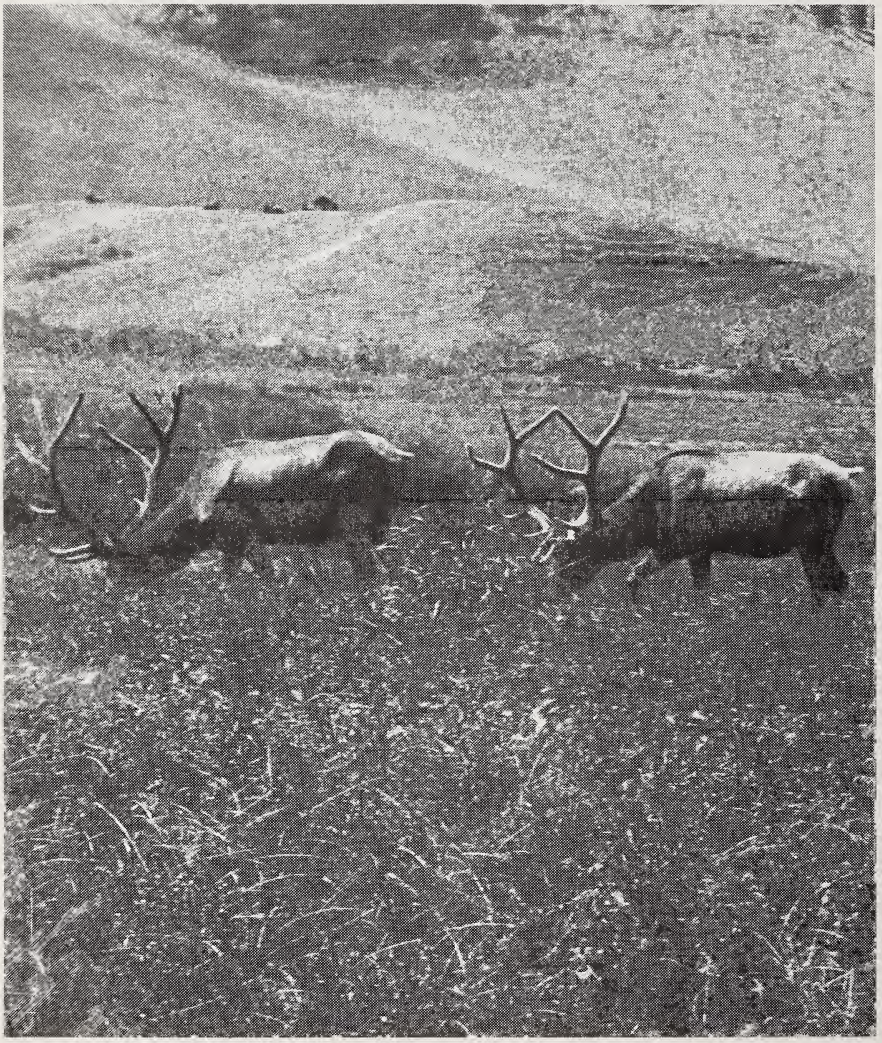

FIGURE 9. Foraging bull elk. Six points on each antler and wide spreading form is typical of the Rocky Mountain species. An 800-pound bull utilizes 14-18 pounds of forage each day. Well filled bodies and pelage luster indicate these animals are in excellent physical condition. The antler growth is about completed and these elk are approaching the peak of annual physical condition just prior to the breeding season.

(Photo by Robert F. Cooney)

FIGURE 10. A typical red deer stag on the Isle of Rhum in Scotland during November. The crown points of antlers may take many forms. A majority of the stags in Scotland have a tendency towards three points on top and some have four points or more. (Photo by Brian Mitchell)

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FIGURE 11. Bull elk with harem in Yellowstone National Park during September. Studies of the Rocky Mountain elk in the northern Yellowstone herd show that skeletal growth for cows is about completed during their third year but in males it requires an additional year. In 64 adult males from four through nine years of age the shoulder height averaged 63 inches with a range of 59 to 69 inches and with an average whole weight of 740 pounds with a range of 470 to 1,010 pounds. Among the males, the whole weight of only one animal exceeded 1,000 pounds while two were in the 900-pound class and 12 in the 800-pound group. About 23 percent of this collection of bulls exceeded 800 pounds and 30 percent weighed less than 700 pounds. The whole weights of nearly half of the bulls were between 700 and 800 pounds (Greer, unpubl.).

Measurements of over 400 cows from three through fifteen years of age had an average shoulder height of 57 inches ranging from 50 to 65 inches and with an average whole body weight of 400 pounds with a range of 320 to 670 pounds. (Yellowstone National Park Photo)

FIGURE 12. In New Zealand a mature red deer stag (male) is about 45 to 48 inches high at the shoulder and the hind (female) is about 40 to 43 inches. In some areas of central Europe and Asia the shoulder height of some stags is about 60 inches.

The body weight of red deer varies according to locality and general availability of food. A typical, mature New Zealand stag will weigh about 300 pounds.

In Scotland, the whole weight of adult red deer stags in one herd averaged 240 pounds with a range of 170 to 285 pounds and adult hinds averaged 165 pounds with a range of 130 to 170 pounds. In another Scotland herd, the whole weights of adult stags ranging from 240 to 340 pounds averaged 290 pounds.

In Norway, several red deer stags of at least 3½ years of age had an average total weight of about 400 pounds with extreme weights ranging from 280 to 560 pounds. Females of similar age averaged 225 pounds and ranged between 180 and 270 pounds (R. Langvatn and S. T. Falck, pers comm.).

(New Zealand Forest Service Photo. J. H. G. Johns, A.R.P.S.)

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FIGURE 13. The elk (wapiti) breeding season in North America occurs duringing September and October and in some herds extends into November. After a gestation period of about eight and one-quarter months most calves are born between late May and early June. At birth the weights of calves average 33 pounds with a range of 19 to 45 pounds. The height at shoulder measurements is not readily available but several total lengths taken of newborn calves ranged from 30 to 44 inches. Most calves lose their spots by August. (Photo by Hector LaCasse)

In March of 1905, a total of 18 wapiti from the United States was successfully released in Fiordland National Park, South Island, New Zealand. An interesting adjustment made by wapiti in the New Zealand environment was a change of breeding season from the September-October period of North America to the March-April period in New Zealand. These differences correspond with the temperate seasons of the two hemispheres.

FIGURE 14. In New Zealand, red deer fawns are born in November and December, about eight months after the March-April breeding season. The prominent white spots in their first pelage are retained for about three months.

The breeding season for red deer in Scotland and Norway occurs from mid-September through mid-October. Most fawns are born during the first week of June but some may appear between mid-May to early July. In Scotland, weights of newborn calves ranged from 6 to 22 pounds and most weigh about 12 to 14 pounds.

(New Zealand Forest Service Photo, J. H. G. Johns, A.R.P.S.)

Reference Abbreviation and Source

Acta Parasitol. Polonica	Acta Parasitologica Polonica Pasteura 3, Warsaw
Acta Therio.	Acta Theriologica, Zaklad Badania Ssakow Polskiej, Akademii Nauk, Bialowieza, Poland.
Akad. Nauk Kazakhsk SSSR	Akademiya Nauk Kaza Khskoi SSSR Alma Ata, Izvestiya, Seriia, Geologicheskaia. Moscow G-200, U.S.S.R.
Akad. Nauk. SSSR Inst. Lesa Soobshck.	Akademiya Nauk SSSR. Botanicheskii Institute Trudy, Moscow U.S.S.R.
Alaska Dept. Fish and Game	Alaska Department of Fish and Game, Juneau, Alaska.
Allg. Forstztg.	Allegmeine Forsteeitung, S. 184 Osterr. Agrarverlag, Bankgasse 1-3 Vienna 1, Austria. (formerly: Zentralblatt fur das Gesamte Forstwesen).
Am. Bison Soc. Rept.	American Bison Society Report, American Bison Society, Coole Printing Co., Boston, Massachusettes; Brooklyn Eagle Press, Brooklyn, New York
Am. Cattle Prod.	American Cattle Producer, American National Livestock Association Publishing Co., Denver, Colorado.
Am. Field	American Field, American Field Publishing Co., Chicago, Illinois.
Am. Forestry	American Forestry, American Forestry Association, Washington, D. C.
Am. J. Vet. Research	American Journal of Veterinary Research, American Veterinary Medical Assn., 600 S. Michigan Ave., Chicago, Illinois.
Am. Mag.	American Magazine, Crowell-Collier Publishing Co., 640 Fifth Ave., New York 19, New York.
Am. Midland Naturalist	American Midland Naturalist, University of Notre Dame, Notre Dame, Indiana.
Am. Mus. Natl. Hist. Bull.	American Museum of National History Bulletin, New York, New York.
Am. Nat.	American Naturalist, Box 1574, Lancaster, Pennsylvania.
Am. Sci.	American Scientist, New Haven, Connecticut.
Am. Soc. Range Mgmt.	American Society of Range Management, Baltimore, Maryland.
Am. Zool.	American Zoologist, American Society of Zoologists, 333 No. Michigan Ave., Chicago, Illinois.

Anat. Anz.	Anatomischer Anzeiger, VEB Gustar Fischer Verlag, Villengang 2, 69 Jena, Germany.
Anim. King.	Animal Kingdom, New York Zoological Society, New York, New York.
Arch. Forstw.	Archir fur Forstwesen, Akademie-Verlag Gmb H., Leipziger Strasse 3-4, Berlin W8, Germany.
Ariz. Farmer.	Arizona Farmer, Arizona Farmer, Inc., Phoenix, Arizona.
Ariz. Farm.-Ranch.	Arizona Farmer-Rancher, Phoenix, Arizona.
Ariz. Game & Fish Comm.	Arizona Game and Fish Commission, Phoenix, Arizona.
Ariz. Wildl. Sptsm.	Arizona Wildlife Sportsman, Phoenix, Arizona.
Aud. Mag.	Audubon Magazine, New York, New York.
Bayer.-Land. GMBH, Bonn-Munch.-Wien.	Bayerisches Landwirtschaftliches Jahrbuch, Lothstr. 29, Munich 13, Germany.
Behaviour, Nether.	Behaviour, Leiden, Netherlands.
Bibliog. Agr.	Bibliography of Agriculture, U. S. Dept. of Agriculture, Washington, D. C.
Biol. Abstr.	Biological Abstracts, Philadelphia, Pennsylvania.
Biol. Bull.	Biological Bulletin, Woods Hole, Massachusetts.
Biol. Soc. Wash. Proc.	Biological Society Washington Proceedings, U. S. National Museum, Washington, D. C.
Boston Soc. Nat. Hist. Proc.	Boston Society of Natural History Proceedings, Boston, Massachusetts
Brit. Vet. J.	British Veterinary Journal, London, W. C. 2, England.
Bull. Acad. Polan. Sci.	Polsaka Akademia. Nauk., Warszawa, Palac Kultury i Nauki.
Bull. Nat. Sci. Mus.	Bulletin of the National Science Museums, Tokyo, Japan.
Calif. Fish & Game	California Fish and Game, San Francisco, California.
Calif. Univ.	University of California Wildland Research Center, Berkeley, California.
Can. Dept. Res. & Dev.	Canadian Department Resources and Development, Ottawa, Canada.
Can. Field-Nat.	Canadian Field-Naturalist, Ottawa Field-Naturalists' Club, Ontario, Canada.

Can. J. Comp. Med. & Vet. Sci.	Canadian Journal of Comparative Medicine and Veterinary Science, National Business Publications Ltd., Gardenvale, Quebec, Canada.
Can. J. Zool.	Canadian Journal of Zoology, National Research Council, Ottawa, 7, Canada.
Can. Nat. & Geol.	Canadian Naturalist and Geologist, Ottawa, Canada.
Can. Wildl. Serv. Wildl. Mgmt. Bull. Ser.	Canadian Wildlife Service Wildlife Management Bulletin, Ottawa, Canada.
Can. Ybk.	Canada Yearbook, Ottawa, Canada.
Century	Century, Ed. & Pub.—B. M. Kakar, 4, Y.M.C.A., Jai Singh Road, New Delhi 1, India.
Colo. Game, Fish and Parks Dept.	Colorado Game, Fish and Parks Department, Denver.
Colo. Outdoors	Colorado Outdoors, The A. B. Hirschfeld Press, Denver, Colo.
Colo. Cons. Com.	Colorado Conservation Comments, Denver, Colorado.
Commonw. For. Rev. Cent. Tit. Serv. Cards	Commonwealth Forestry Review Centralized Title Service Cards, Royal Commonwealth Society, London W. C. 2, England.
Conserv. Vol.	Conservation Volunteer, Minnesota Conservation Dept., St. Paul, Minnesota.
Conserv.	Conservationist, New York State Conservation Dept., State Campus, Albany, New York.
Country Gentleman	Country Gentleman, Curtis Publishing Co., Independence Square, Philadelphia 5, Pennsylvania.
Csl. Morfologie	Folia Morphologica, Publishing House of the Czechoslovak Academy of Sciences, Vodickova 40, Prague 1, Czechoslovakia (formerly Ceskoslovenska Morfologie).
Dan. Rev. Game Bio.	Danish Review of Game Biology, Copenhagen, Denmark.
Def. of Wildl. News	Defenders of Wildlife News, 1346 Connecticut Avenue, N.W., Washington, D.C.
Dissertation Abstr.	Dissertation Abstractions, University Microfilms, 313 N. First St., Ann Arbor, Michigan.
Ecol.	Ecology, Brooklyn, New York.
Ecol. Soc. Am. Bull.	Ecological Society of America Bulletin, Oak Ridge National Laboratory, Oak Ridge, Tennessee.

Ekologia Polska	Ekologia Polska, Warszawa, Poland.
Essex. Inst. Bull.	Essex Institute. Historical Collections, 132 Essex Street, Salem, Massachusetts.
Extrait de La Terre et la Vie.	La Terre et la iVe, Societe Nationale d'Acclimation et de Protection de la Nature, 57 rue Culver, Paris (5e), France.
Fauna, Norway	Fauna, Norsk Zoologisk Forening, Unisersiteteti Oslo, Zoologisk Museum, Sarsgt. 1, Oslo 5, Norway.
Field-Nat.	Field Naturalist, Casterton, Kirkby, Lonsdale via Carnforth, England.
Field & Stream	Field and Stream, Henry Holt & Co., New York, New York.
Folio Biol.	Folia Biologica, Zaklad Zoologii Doswiadczalnej., Pan'stwowe Wydawnictw Naukowe, ul. Miodowa 10, Warsaw, Poland.
For. Sci.	Forest Science, Washington, D.C.
For. Serv. Rpt.	Forest Service Report, Washington, D.C.
Forestry	Forestry, Society of Foresters of Great Britain, Oxford University Press, Ely House, 37 Dover St., London W 1, England.
Geog. Rev.	Geographical Review. American Geographical Society, New York.
Geog. Soc. Chicago Bull.	The Geographic Society of Chicago Bulletin, Chicago, Illinois.
Glacial Drift	U. S. National Park Service, Washington, D.C.
Health Physics	Pergamon Press, Printed in Northern Ireland.
Holz-Zbl.	Holz-Zentralblatt, Holz-Zentralblatt Verlags GmbH., Postbach 104, 7 Stuttgart 1, Germany.
H. Rep. Subcom. Natl. Parks, Com. Int. Ins. Aff.	House of Representatives Subcommittee on National Parks of the Committee on Interior and Insular Affairs, Wash., D. C. Steno. transcript—Veley Reporting Co., 306 9th St. N.W., Wash. 4, D.C.
Ida. Dept. Fish & Game	Idaho Department of Fish and Game, Boise, Idaho.
Ida. Univ. Bull.	University of Idaho Bulletin, Moscow, Idaho.
Ida. Wildl. Rev.	Idaho Wildlife Review, Idaho Fish and Game Dept., Boise, Idaho.
Interm. For. & Ran. Expt. Sta. Res. Paper	Intermountain Forest and Range Experiment Station Research Paper, Ogden, Utah.

J. Anat.	Journal of Anatomy, Cambridge, England.
J. Animal Ecol.	Journal of Anical Ecology, British Ecological Society, Blackwell Scientific Publications, Oxford, England.
J. Anim. Sci.	Journal of Animal Science, American Society of Animal Science, Menasha, Wisconsin.
J. For.	Journal of Forestry, Washington, D.C.
J. Mammal.	Journal of Mammalogy, American Society of Mammalogists, Allen Press, Lawrence, Kansas.
J. Microbiol., Epidemiol., & Immunol.	Journal of Microbiology, Epidemiology, and Immunology, Union of Soviet Socialist Russia, Moscow, Russia.
J. Range Mgmt.	Journal of Range Management, Baltimore, Maryland.
J. Wildl. Mgmt.	Journal of Wildlife Management, Menasha, Wisconsin.
Kans. Acad. Sci. Trans.	Kansas Academy of Science Transactions, Topeka, Kansas.
Land-Forest-Wildlife	Department of Lands and Forest, Edmonton, Alberta, Canada.
Land. GmbH, Nr.	Landwirtschaftsverlag GmbH, Nr. 78 der Landwirtschaft, Hiltrup b. Munster, West Germany.
Lewis & Clark Natl. For.	Lewis and Clark National Forest, Helena, Montana.
London Soc. Proc.	London Society Proceedings, c/o London Society Journal, 3 Dean's Yard, Westminster, London S. W. 1, England.
Lutra	Society for the Study and Protection of Mammals, Oude Rijn 33a, Leiden, Netherlands.
Mamm. (Paris)	Mammalia, Paris, France.
Mamm. (Moscow)	Mammals, Pub. by Academy of Science of USSR, Moscow, Leningrad.
Mammals, (Wash.)	Mammals, Washington, D. C.
Mich. Conserv.	Michigan Conservation, Michigan Department of Conservation, Lansing, Michigan.
Mo. Hist. Rev.	Missouri Historical Review, State Historical Society of Missouri, Columbia, Missouri.

Mod. Game Breeding	Modern Game Breeding, Agricultural & Zoological News, 300 Front Street, Boiling Springs, Pennsylvania.
Mont. Acad. Sci. Proc.	Montana Academy of Sciences Proceedings, Helena, Montana.
Mont. Fish & Game Dept.	Montana Fish and Game Department, Helena, Montana.
Mont. State Univ. Dept. Bot.-Bact. and Vet. Res.	Montana State University, Department of Botany-Bacteriology and Veterinary Research, Bozeman, Montana.
Mont. Univ. Schl. For., For. Kaimin.	Montana University School of Forestry, Forestry Kaimin, Missoula, Montana.
Mont. Wildl.	Montana Wildlife, Montana Fish and Game Department., Helena, Montana.
Mont. Wildl. Fed. News	Montana Wildlife Federation News, 622 Clark Ave., Billings, Montana.
Mosc. Izdat. Akad.	Moscow Izdat. Akad. Nauk SSSR.
Murrelet	Murrelet, Pacific Northwest Bird & Mammal Society, University of Puget Sound, Tacoma, Washington.
Nat.	Nature, London, England.
Nat. Cons.	The Nature Conservancy, London S. W. 1, England.
Nat. Cons. Scot.	The Nature Conservancy, 12 Hope Terrace, Edinburgh 9, Scotland.
Nat. Hist.	Natural History, American Museum of Natural History, New York, New York.
Nat. Mag.	Nature Magazine, American Museum of Natural History, Central Park West at 79th St., New York, New York.
Nat. Sci. Mus. (Tokyo)	Natural Science Museums, Tokyo, Japan.
Natl. Geo. Mag.	National Geographic Magazine, Washington, D.C.
Natl. Park Serv.	National Park Service, Washington, D.C.
Natl. Parks Mag.	National Parks Magazine, Washington, D.C.
Natl. Wildl.	National Wildlife, Washington, D.C.
Natl. Wool Gro.	National Wool Grower, National Wool Growers Association, Salt Lake City, Utah.
Natr.	Naturalist, W. S. Maney & Son Ltd., Leeds 9, England.
Nauk SSSR	Nauk SSSR, Moscow, U.S.S.R.
Ned. Bosbouw Tijdschr.	Nederlands Bosbouw Tijdschrift, Lovinklaan 1, Arnhem, Netherlands.
New Mex. Conserv.	New Mexico Conservation, State College, New Mexico.

New Mex. Game & Fish Bull.	New Mexico Game and Fish Bulletin, Santa Fe, New Mexico.
N. Y. State For. Fish & Game Comm.	New York State Forest, Fish and Game Commission, State Office Bldg., Albany 1, New York.
N. Y. Zool. Soc. Bull.	New York Zoological Society Bulletin and Conservation Foundation, New York 16, New York.
N. Z. Dept. Sci. & Ind. Res. Bull.	New Zealand Department of Science and Industry Research Bulletin, Christchurch, New Zealand.
New Zeal. For. Serv. Tech. Papers	New Zealand Forest Service Technical Papers, Director of Forestry, CPO Box 894, Wellington, New Zealand.
N. Z. J. For.	New Zealand Journal of Forestry, Christchurch, New Zealand.
N. Z. J. Sci.	New Zealand Journal of Science, Department of Scientific and Industrial Research, Box 8018, Wellington, New Zealand.
N. Z. J. Sci. & Technol.	New Zealand Journal of Science and Technology, Christchurch, New Zealand.
New Zeal. Wildl.	New Zealand Wildlife, New Zealand Deerstalker's Association, Wellington, New Zealand.
N. Am. Fauna	North American Fauna, Washington, D.C.
North Dak. Outdoors	North Dakota Outdoors, Game and Fish Department, Bismarck, North Dakota.
N. Region News	North Region News, U. S. Forest Service, Missoula, Montana.
Northw. Sci.	Northwest Science, Cheney, Washington.
Okhota & Okhotnich'e Khoz.	Okhota i Okhotnichyye Khozyaistuo, Mezdunarodnaya Kniga, Smolenskaya Sennayo 32/34, Moscow G-200, U.S.S.R.
Okla. Acad. Sci. Proc.	Oklahoma Academy of Science Proceedings, Enid, Oklahoma.
Ore. State Game Comm. Bull.	Oregon State Game Commission Bulletin, Box 3503, Portland, Oregon.
Ottawa Nat.	Ottawa Field Naturalists, Ottawa, Canada.
Outd. Amer. Iz. Walton Mag.	Outdoor America (now called: Izaak Walton Magazine), Izaak Walton League of America, 1326 Waukegan Road, Glenview, Illinois.
Outdoor Mont.	Outdoor Montana, Montana Fish and Game Dept., Helena, Montana.
Outdoor Life	Outdoor Life, Popular Science Publishing Co., Inc., 355 Lexington Avenue, New York, New York.

Outdoors	Outdoors, Kiekhafer Corp., Brunswick Corp., Fond du Lac, Wisconsin.
Pac. Disc.	Pacific Discovery, California Academy of Sciences, San Francisco 18, California.
Pa. Game News	Pennsylvania Game News, Pennsylvania Game Commission, Harrisburg, Pennsylvania.
Pac. Sci. Cong.	Pacific Science Congress, Pacific Science Board, National Research Council, Washington, D.C.
Primenenie Mathematicheskikh	Primenenie Mathematicheskikh, Metadov V. Biologu, Leningradsk University, Leningrad, U.S.S.R.
Proc. Ann. Conf. W. Assoc. State Game and Fish Comms.	Proceedings of Annual Conference of Western Association of State Game and Fish Commissioners.
Proc. Zool. Soc.	Proceedings of Zoological Society, London, England.
Pol. Akad. Nauk	Polsaka Akademia Nauk, Warszawa, Palac Kultury i Nauki.
Prod.	Producer, Co-operative Wholesale Society Ltd., 1 Balloon St., Manchester, England.
Przegl. Zool.	Przeglad Zoologiczny, Panstwowe Wydanictwa 10, Warsaw, Poland.
Queensland J. Agr. Sc.	Queensland Journal of Agricultural Science, Brisbane, Australia.
Recreation	Recreation, National Recreation Assn., 8 W. Eighth St., New York, New York.
Referat. Zhur. Biol.	Referatiunyi Zhurnal Biologiya, Institut Nauchnoi Informatzii, Baltiiskaya ul.14, Moscow A-219, U.S.S.R.
Rev. For. Franc.	Revue Forestiere Francaise, Ecole Nationale des Eaux et forets, 14 rue Girardet, Nancy, France.
Rev. Suisse Zool.	Revenue Suisse de Zoologie, Monbijoustrasse 61, 3007 Bern, Switzerland.

Rocky Mt. For. & Range Expt. Sta. Res. Notes	Rocky Mountain Forestry & Range Experimental Station Research Notes, Forestry Bldg., Colorado State U., Ft. Collins, Colorado.
Rocky Mt. Nat. Assn.	Rocky Mountain Nature Association, Estes Park, Colorado.
Roosevelt Wildl. Bull.	Roosevelt Wildlife Bulletin, Washington, D.C.
Sat. Evng. Post	Saturday Evening Post, Curtis Publishing Co., 641 Lexington Ave., New York, New York.
Saugetierk, Mitteil., Stuttgart	Saugetierkundliche Mitteilungen, Franckh'sche Verlagsbuchhandlung, Stuttgart, Germany.
Schweiz. Z. Forstw.	Schweizerische Zeitschrift Fur Forstwesen, Journal Forestier Suisse, Schweizerischer Forstverin, Englischviertelstr. 32, Zurich, 7/32, Switzerland.
Science	Science, American Assn. for the Advancement of Science, Washington, D. C
Sci. Rept. Yok. Natl. Univ.	Science Report of Yokohama National University, Yokohama, Japan.
Sen. Docu.	Senate Document, Government Printing Office, Washington, D.C.
Sen. Ex. Doc.	Senate Exchange Document, Washington, D.C.
Sierra Club Bull.	Sierra Club Bulletin, 1050 Mills Tower, San Francisco, California.
Soil Conserv.	Soil Conservation, Superintendent of Documents, Washington, D.C.
Soob. Inst. Lesa. Akad.	Soobshch Institute Lesa Akad. Nauk SSSR.
Sunset	Sunset, Lane Magazine & Book Co., Menlo Park, California.
Terre et Vie	Terre et La Vie, Societe Nationale d'Acclimation et de Protectionde la Nature, 57 rue Cuvier, Paris (5e), France.
Texas Agr. Exp. Station	Texas Agricultural Experimental Station, Texas Agricultural Progress, College Station, Texas.

Trans. N. Am. Wildl. Conf.	Transactions of the North American Wildlife Conference, Washington, D.C.
Trans. Wis. Acad. Sci. Arts, & Let.	Transactions of the Wisconsin Academy of Science, Arts, and Letters, Madison, Wisconsin.
U. S. Atomic Energy Comm.	United States Atomic Energy Commission, Washington, D.C.
U. S. Comm. Agr. Rept.	United States Commission Agricultural Report, U. S. Department of Agriculture, Washington, D.C.
U. S. Dept. Agr. Bio. Surv. Wildl. Lfl.	United States Department of Agriculture Biological Survey Wildlife Leaflet, Washington, D.C.
U. S. Dept. Agr. Dept. Circs.	United States Department of Agriculture Department Circular, Washington, D.C.
U. S. Dept. Agr. For. Ser.	United States Department of Agriculture Forest Service, Washington, D.C.
U. S. Dept. Int., Fish & Wildl. Serv. Lfl.	United States Department of Interior, Fish and Wildlife Service Wildlife Leaflet, Washington, D.C.
U. S. Emer. Cons. Com.	United States Emergency Conservation Committee, Washington, D.C.
U. S. For. Serv.	United States Forest Service, Washington, D.C.
U. S. Gov't. Print. Off.	U. S. Government Printing Office, Washington, D.C.
Utah St. Agr. Col. Misc. Pub.	Utah State Agricultural College Miscellaneous Publication, Utah State University, Logan, Utah.
Utah State Dept. Fish & Game	Utah State Department of Fish and Game F. A. Division, Salt Lake City, Utah.
Utah Univ. Bull.	Utah University Bulletin, Logan, Utah.
Va. Game & Fish Conserv.	Virginia Game and Fish Conservationist, Richmond 13, Virginia.
Va. Wildl.	Virginia Wildlife, Virginia Game & Fish Commission, Richmond, Virginia.
Ves.	Vesmir, Publishing House of the Czechoslovak Academy of Sciences, Vodickova 40, Prague, Czechoslovakia.

Veter.	Veterinariya, Mezhdunarodnaya Kniga, Moscow G-200, U.S.S.R.
Vilt. (Swed. Wildl.)	Viltrevy, Swedish Wildlife, Svemska Jagareforbundet, Ostermalmsgnatan 39, Stockholm O. Sweden.
Wash. House Docu.	Washington House Document, Washington, D.C.
Wash. St. Game Bull.	Washington State Game Bulletin, Pullman, Washington.
Wash. Acad. Sci. J.	Washington Academy of Sciences Journal, Baltimore, Maryland.
West. Fish & Game Digest	Western Fish and Game Digest, Box No. 2305, Hollywood 28, California.
West. Outdoors	Western Outdoors, American Outdoors Inc., 328 North Newport Blvd., Newport Beach, California.
Wildl. Disease Assoc. Bull.	Wildlife Disease Association Bulletin, 333 N. Michigan Ave., Chicago, Illinois.
Wildl. Mgmt. Inst.	Wildlife Management Institute, Washington, D.C.
Wildl. Mono.	Wildlife Monographs, The Wildlife Society, Inc., Suite 615, 2000 P Street N. W., Washington, D. C.
Wildl. Rev.	Wildlife Review, Patuxent Research Refuge, Laurel, Maryland.
Wis. Acad. Sci. Arts & Letters	Wisconsin Academy of Sciences, Arts and Letters, Madison, Wisconsin.
Wis. Conserv. Bull.	Wisconsin Conservation Bulletin, Wisconsin Conservation Department, Madison, Wisconsin.
WR 91:62	Wildlife Review, Patuxent Research Refuge, Laurel, Maryland (Volume 91, Page 62).
Wyo. Agr. Expt. Sta. Bull.	Wyoming Agriculture Experimental Station Bulletin, Wyoming Agriculture, 1948 Grand, Laramie, Wyoming.
Wyo. Game & Fish Comm. Bull.	Wyoming Game and Fish Commission Bulletin, Box 378, Cheyenne, Wyoming.
Wyo. Range Mgmt.	Wyoming Range Management, University of Wyoming, Laramie, Wyoming.

Wyo. Wildl.	Wyoming Wildlife, Wyoming Game and Fish Commission, Box 378, Cheyenne, Wyoming.
Yellows. Nat. Notes	Yellowstone Nature Notes, Mammoth, Wyoming.
Z. Jagdwiss	Zeitschrift fur Jagdwissenschaft, Verlag Paul Parey, Spitalerstr. 12, 2000 Hamburg 1, Germany.
Z. Tierpsychol.	Zeitschrift fur Tierpsychologie, Tierernahrung und Futtermittelkunde Verlag Paul Parey, Spitalerstr. 12, 2000 Hamburg 1, Germany.
Z. Tropenmed. u Parasitol	Zeitschrift fur Tropenmedzin und Parasitologie, Ed. Bd. George Thieme Verlag, Herdweg 63, 7 Stuttgart, Germany.
Zoologica	Zoologica, New York Zoological Society, New York, New York.
Zool. Garten	Der Zoologischer Garten, Leipsiz, Germany.
Zool. Soc. London Proc.	Zoological Society of London Proceedings, Zoological Society of London, London, England.
Zool. Zhur.	Zoologicheski Zhurnal, Mezhdunarodnaya Kniga, Moscow G-200, U.S.S.R.

FIGURE 15. A young stag and hind red deer in Canterbury, New Zealand during May. Note the rather pointed rump as compared to the rounded conformation of elk.
(New Zealand Forest Service Photo, J. H. G. Johns, A.R.P.S.)

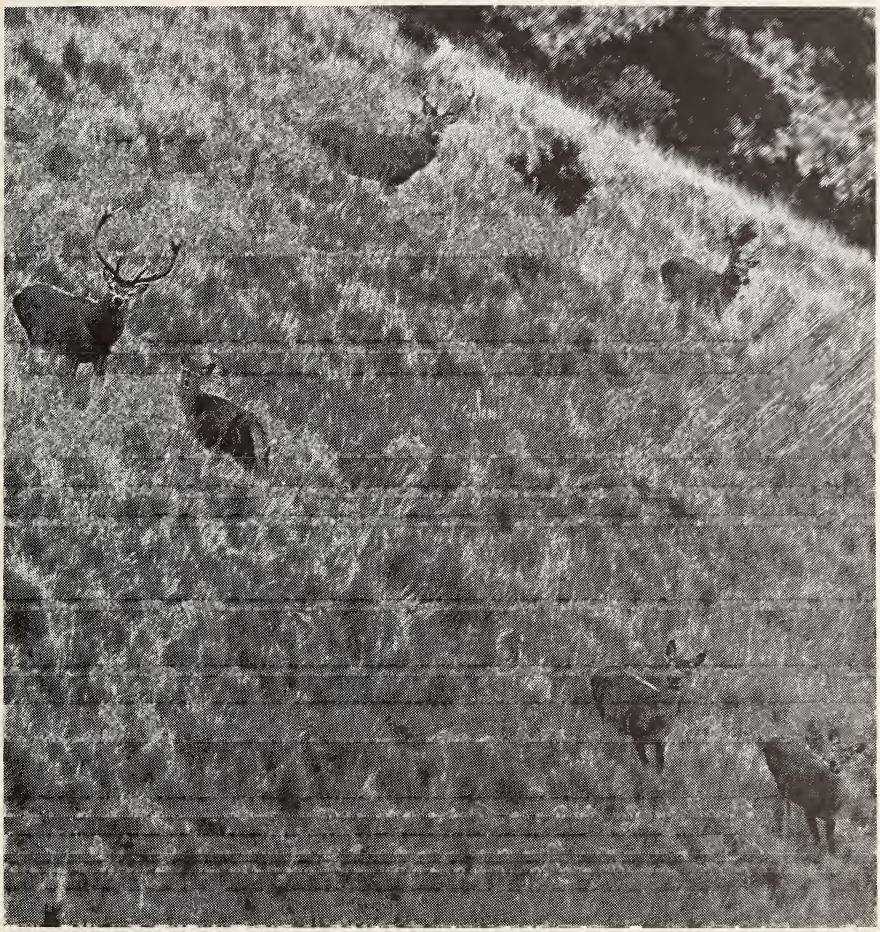

FIGURE 16. A group of red deer stags (bulls) and hinds (cows) in Canterbury, New Zealand during May. Note the variation of antler formation of the three stags. Presumably the stag at right has its second set of antlers. A more mature stag at left is indicated by the pearled tips and crown form of terminal tines.

(New Zealand Forest Service Photo, J. H. G. Johns, A.R.P.S.)

Subject Index

This is a partial index to provide a broad orientation for some general categories. A subject index is not a substitute for a thorough review of the literature.

Unless of historical significance, most popular articles, short notes and partial reports are not indexed. Since some reports cover several subjects each reference was limited to three subject headings. Articles of a broad scope which include more than three subjects are under the heading of general studies.

An asterisk (*) preceding a name indicates the article is concerned with red deer.

AGE-SEX COMPOSITION
Arness 1960
Bendt 1962
Boyd 1965
Boyd 1965a
Boyd 1965b
Boyd 1966
Boyd 1966a
Boyd 1967
Dasmann 1965
*Eygenraam 1962
Gill 1967
Green 1950
Greer 1965
Greer 1965a
Hancock and Low 1956
Harris 1961
Harris 1961a
Harris 1964
Hunter 1945
Jonkel 1959-1964
Longhurst 1957
*Lowe 1968
Martinka 1965
McCormack 1951
Miers 1962
Mohler, Dalke and Shaw 1958
Moran 1964
Moran 1965
Moran 1966
Moran 1967
Moran 1968
Murphy 1963
Peek 1965
Peek, Lovaas and Rouse 1967
Picton 1961
Prenzlow 1967
Prenzlow 1968
*Riney 1956
*Valentincic 1959
White 1959
*Yanushko 1958

ARTIFACTS OR ORNAMENTS
Flannery 1953
Greer 1968
Johnson 1923
U.S. Bureau of American Ethnology 1881-1933

BEHAVIOR
Altmann 1952
Altmann 1953
Altmann 1956
Altmann 1956a
Altmann 1958
Altmann 1960
Altmann 1963
Altmann and Simon 1952
*Bubenik and Brna 1967
*Burckhardt 1958
Davis and Robertson 1944
*Delap 1957
DeVos, Brokx and Geist 1967
*Eygenraam 1963
Graf 1956
*Hennig 1960
*Howard 1965
Martinka 1965
McCullough 1966
McHugh 1958
Murie 1932
*Pilipowicz 1961
*Schloeth 1966
Struhsaker 1967
Thompson 1941

CALVES
Boll 1958
Horn 1960
Johnson 1950
Johnson 1951
Moran and Ozoga 1965

CENSUS
Anderson 1914
*Batcheler 1960
Buechner 1950
Buechner, Buss and Bryan 1951
Cahalane 1938
Casagranda 1950
Casagranda 1958
Cross 1966
Gerasimov 1963
Grater 1939
Harris 1961
Hofer 1887
Horsfall 1927
LaNove 1938
Lovaas, Egan and Knight 1966
Murie 1951
Owens 1960
Owens 1962
Riordan 1948
Stockstad 1954

CLIMATE
*Christie 1967
*Gizenko 1963

COMPETITION
Amaral 1964
Blood 1966
Buechner 1950
Buechner and Whittaker 1954
Cahalane 1939

Capp 1967
Capp 1968
Case 1938
Cliff 1939
Constan 1967
Cowan 1947
Eustace 1967
Gysel 1960
Haskell 1946
Hough 1918
Jeffrey 1963
Jones 1960
Jonkel 1959-1964
Julander and Jeffrey 1964
Julander, Robinette, Smith and Gaufin 1950
Mackie 1961
Mackie 1965
McMillan 1953
Morris 1955
Morris 1956
Morris and Schwartz 1957
Packard 1947a
Pickford and Reid 1943
*Poole 1951
Rouse 1958-1961
Rush 1932
Schallenberger 1965
Skinner 1929
Smith 1961
Stevens 1965
Stevens 1966

CROP DAMAGE, FOREST DAMAGE, OVERBROWSE

*Almasan 1966
*Bonnemann 1957
Boyd 1964
*Brutt 1957
*Burckhardt, Kuster and Schloeth 1961
*Chard 1966
*Conway 1949
*Daburon 1963
Dale 1930
*Dinesman 1959
*Ehrlich 1963
*Ernest 1965
Gaffney 1938
Gaffney 1941
*Hennig 1960
Haskins and Dalke 1955
Kaletskaya 1959
*Lenz 1964
McCulloch 1953
McCulloch 1955
Mitchell 1949
Mitchell 1950
Mueggler 1967
*Neumann 1965
Rush 1940
*Ruskov and Petrov 1963
Schard 1959
*Soest and Stefels 1965
*Szederjei 1957
Tanner 1956
*Ueckermann 1955
*Ueckermann 1956
*Vasic 1959
Wagar 1946
*Wagenknecht 1965
*Walsh 1892
*Wardle 1961
*Webb 1960
*Wodarz 1962
Young and Payne 1948

DETAILED GENERAL STDUIES

Allen 1942
Anderson 1958
Banwell 1966
Cross 1965
*Darling 1937
*Donne 1925
Graf 1955
Guse, Rice, Carr and Denney 1965
Harn 1958
Harper, Harn, Bentley and Yocom 1967
Knight 1967
Lovaas 1962-1965
*Lowe 1961
*Lydekker 1898
Madson 1966
*Mitchell 1967
Murie 1951
Newman 1958
*Page 1957
*Raesfeld 1957
Roosevelt, Van Dyke, Elliot and Stone 1902
Rush 1939
Schwartz 1939
Sell 1954
Seton 1909
Skinner 1936a
Strahorn 1881
Strong 1876
Trefethen 1961
Trippensee 1948
U. S. Congress 1967
*Von Raesfeld 1957
Webster 1920
West 1941
*Whitehead 1958
Wood 1943

DISTRIBUTION

*Ahlem 1965
Allen 1871
Allen 1875
Allen 1892
Allen 1902
*Allen 1938-1940
American Sportsman 1872
1873
1874
Anderson 1938
Ashe 1808
Audubon 1897
Audubon and Bachman 1846-1854
Bailey 1896
Bailey 1937
Baird 1857
*Barclay 1935
Barlow and Heap 1872
Barnes 1927
Batchelor 1963
Batchelor 1965
Bendt and Anderson 1958
*Bentley 1957
*Bentley 1967
Benwell 1966
Brickell 1737
*Cahalane 1939
Cahn 1921
Cahn 1937
*Caughley 1963
Cox 1916
Crawford 1926
Cross 1950
Dalquest 1948
Dasmann 1965
*Davidson 1965
*Davidson and Kean 1960
Davis and Robertson 1944
Deacon, Bradley and Larsen 1965
DeKay 1842
Denney 1965b
Dice 1919-1920
Donck 1650
Donck 1656
Dymond 1926
Evans 1965
Fashingbauer 1965
Fisher 1934
*Flerov 1952
Forest and Stream 1873
Forest and Stream 1875
Forest and Stream 1876
Gerstell 1936

Gilman 1896
Goodwin 1940
Gregg 1845
Grinnell 1875
Grinnell 1913
Grinnell 1925
Grinnell 1936
Halladay 1964
Halloran 1963
*Haltenorth and Trense 1956
Hatt 1949
Hays 1871
Hoffman and Pattie 1968
Hoffmeister 1947
*Holloway 1950
Hornaday 1913
Houston 1968
*Ingebrigsten 1924
*Ingebrigsten 1927
Ingles 1947
*Jefferies 1884
Johnson 1930
Kartchner 1940
*Kroning and Vorreyer 1957
Lang 1958
Latham 1954
Leopold 1947
Love 1930
Ludlow 1876
*Lydekker 1900
*Lydekker 1901
Mace 1956
*MacPherson 1896
Marcy 1866
McAllister 1919
McCullough 1965
McCullough 1966
McDermott 1951
McKinley 1960
Miers 1962
Mitchell and Laukhart 1948
Moffitt 1964
Moran 1964
Moran 1967
Moran and Ozoga 1965
Murie 1935
Murie 1936
Murie 1951
Murphy 1879
*Olaff 1965
Parkman 1946
Peek and Lovaas 1968
*Poole 1951
*Riney 1956
*Riney, Watson, Bassett, Turbott and Howard 1959
*Roberts 1968
*Roff 1960
*Rusanov 1963
Russell 1921
*Salez 1959
Schantz 1956
Schorger 1954
Seton 1898
Sheldon 1912
Sheldon 1932
Skinner 1916
Smith 1929
Smith 1930
Sura 1967
Svihla 1931
Swift 1945
Taber 1963
Thwaites 1899
U.S. Bureau of Biological Survey
U.S.D.A. 1905
1931
1936
Van Dyke 1902
*Webb 1960
*Wodzicki 1965
Yarrow 1875

ECOLOGY

*Ahlen 1965b
Batchelor 1960
Batchelor 1965
*Bubenik, Lochman and Prusek 1956
*Cameron 1923
Craighead 1952
Deacon, Bradley, and Larsen 1965
Galbraith 1963
Halladay 1964
Harper 1966
*Kazneuskii 1959
Lang 1958
*Mambetzhumaev 1961
*Oloff 1965
Picton and Janson 1968
*Poole 1951
*Riney 1956
*Sablina 1959
*Samoilov 1962
Shelford 1937
Smith 1930
Smith 1960
Sperry 1936
Steele 1960
Sura 1967
Wilbert 1963
*Wodzicki 1961

ELK DOMESTICATION

Butler 1934
Caton 1877
Forest and Stream 1910
Jackson 1930
Kellog 1887
Lantz 1910
Love 1955
*Salganskii 1962

FOOD HABITS

Baker, B. 1965
Baker, T. 1953
Baldwin and Patton 1938
Boll 1958
Boll 1958a
*Bonnemann 1957
Brazda 1953
Brown 1936
*Bubenik and Lochman 1956
Buechner 1950
Buechner and Whittaker 1954
Burt and Gates 1959
Buss 1967
Cahalane 1943
Case 1938
Cole 1959
Dale 1930
DeNio 1938
DeNio 1938a
DeNio 1938b
*Dzieciolowski 1967
Eustace 1967
*Eygenraam 1960
Gaffney 1938
Gaffney 1941
Geis 1954
*Gill 1961
Greer, Kirsch and Yeager 1968
Greffenius 1938
Grimm 1939
Harper 1962
*Hegg 1961
Helwig 1957
Hoskins and Dalke 1955
Hungerford 1952
*Jensen 1958
*Jensen 1958a
Kirsch 1962
Kirsch 1963
Lommasson 1927
Lyman 1964
*Mambetzhomaev 1961
McCulloch 1953
McCulloch 1955
Montana 1955-1968
Morris and Hungerford 1952
Morris and Schwartz 1957

Morris, et al. 1958
Nichols 1957
Orr 1937
Packard 1942
Packard 1947a
Peek 1965
Robinette 1939
Rouse 1957
Rush 1932
*Sablina 1959
Skinner 1928
Skinner 1936
Swift 1941
*Szederjei 1957
*Teagle 1963
Troyer 1960
U.S. Forest Service 1937
West 1941
Wright 1935
Young 1938

HARVEST

*Batcheler 1960
Casagranda, Picton and Janson 1959
Forest and Stream 1882
Gaab 1952
Gaufin 1948
Turner 1968

GAME RANGES

Burtch 1934
Cooney 1955
Cooney 1957
Cooney 1961
Couey 1947
Davis and Emerson 1927
DeWeese 1927
Dilg 1925
McDowell 1942
Morse 1958
Murie 1935a
Ormiston 1968
Sperry 1936
U.S. Fish and Wildlife Service USDI 1963
Young and Robinette 1939

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Audubon, and Bachman 1846-1854
Audubon 1897
Bailey 1896
Baird 1857
Barlow and Heap 1872
Bartram 1928
Beaman 1888
Billings 1856
Blomfield 1914
*Bodenheimer 1960
Boyd 1966
Bradley 1966
Brooks 1926
Burroughs 1961
*Buttrick 1962
Cahn 1921
Cahn 1939
Caton 1877
Chittenden and Richardson 1905
Cook 1931
Craig and McLucas 1962
Crane 1951
Dice 1919-1920
Doane 1871
Dodge 1959
Donck 1650
Donck 1656
Dunraven 1876
Dunraven 1917
Dunraven 1967
Dymond 1926
Ellsworth 1930
Ellsworth 1931
Elmhirst 1891
Elrod 1926
Evans 1965
Evermann 1915
Evermann 1916
Ferris 1940
Fish 1913
Fisher 1934
Forest and Stream
1885
1886
1887
1887a
1887b
1890
1892
1892a
1897
1908
1910
Gerstell 1936
Gilmore 1947
Gregg 1845
Grinnell 1875
Guthrie 1966
Hallaran 1963
Hays 1871
*Hofer 1887
Hoffmeister 1947
Hornaday 1913
Hough 1894
Hough 1894a
Hoy 1882
Johnson 1930
Kelly 1926
Koch 1940
Koch 1941
Landon 1931
Lang 1958
Leek 1914
Leopold 1947
Ludlow 1876
March 1866
Marsh 1884
Mathews 1868
*McCullough, W. 1962
McCullough, D. 1965
McCullough, D. 1966
McDermott 1951
McKinley 1960
Merrill 1908
Moffitt 1934
Murphy 1879
Russell 1921
Schorger 1954
Seton 1909
Smith 1901
Stelfox 1964
Swank 1945
Thwaites 1899
Thwaites 1905
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U.S. Bureau of Biological Survey USDA 1905
1926
1931
1936
Van Dyke 1902
Wasem 1963
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Wintemberg 1926
Young 1899

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Blomfield 1914
Boone and Crockett Club, Committee on Records 1958
*Burckhardt, Kuster, and Schloeth 1961
*Cameron 1923
Denney 1961
Denney 1964
*Donne 1924a
Dunraven, E. 1967
Dunraven, W. 1876
Dunraven, W. 1917
Edson 1949
Ellsworth 1930
Elmhirst 1892
Fish 1913
Forest and Stream
1876
1882
1887
1887
*Haltenorth and Trense 1956

*Harris 1967
*Henderson 1960
Himmelwright 1895
Hunter 1959
*Joll 1968
Longhurst 1957
Mace 1956
Marsh 1884
Millias 1915
Miller 1884
Mohler, Dalke and Shaw 1958
Montana 1966
Murie 1947
Murie 1952
Murphy 1963
Roosevelt 1893
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Ainsworth 1932
Anonymous 1917
*Bugengren 1956
Caton 1877
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Colls 1952
Cantor 1965
Cooney 1954
Cottam and Williams 1943
Cross 1950
*Donne 1924
Graf 1943
Graves and Nelson 1919
Graves and Nelson 1919a
Green 1933
Green 1946
*Herre and Wiermann 1960
Hornaday 1935
*Hudson 1922
Jones 1953
Kavanagh 1930
Leek 1914
Mace 1956
*McIntosh, Staples and Morris 1959
Moffitt 1934
Murie 1929
Murie 1935
Murie 1936
Murie, M. and O. J. Murie 1966
Skinner 1920
*Szunyoghy 1963
*Vogt 1936
*Wodzicki 1952
*Wodzicki 1961

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*Abramov 1959
Alaska Department of Fish and Game 1960-1961
Amaral 1964
Anonoymous 1957
Baggley 1935
Banfield 1949
Barrus 1968
*Batcheler and Logan 1963
Batchelor 1965
Blouch and Moran 1965
Brown 1968
Cahalane 1941
Cahalane 1943
Cahalane 1943a
Carpenter 1928
*Chard 1966
Child 1935
Cooney 1950
Cooney 1952
Crane 1951
*Daburon 1963
*Daniel 1962
*DeCrombrugghe 1964
Denney 1963
Denney 1964
Dresskell 1961
Elliott 1935
*Eygenraam 1960
*Eygenraam 1962
Forest and Stream 1880
Galbraith 1963
Gairison 1961
Graves 1920
Hancock 1955
*Henderson 1960
*Hennig 1960
Holt 1936
*Howard 1965
Howe 1962
Leopold, Cain, Cottam Gabrielson and Kimball 1963
Gabrielson and Kimball 1963
Garthwaite 1967
Lovaas 1965
Meyers 1938
Mitchell and Lauckhart 1948
Montana 1936
Montana 1961
Montana 1964
Montana 1964a
Montana 1965
Montana 1966
Moran 1965
Moran 1966
Moran 1967
Moran 1968
Morrison 1960
Murie 1934
Murie 1937
Murie 1943
Olsen 1942
Owings 1965
Pautzke, Lauckhart and Springer 1939
Peek 1966
*Peterle 1958
Picton 1959
Picton 1961
Rasmussen and Doman 1947
*Reinders 1960
*Riney 1956
*Riney 1957
Rush 1934
Rush 1940
*Ruskov and Petrov 1963
*Samoilov 1962
Sawtelle 1939
*Schulz 1960
Schwartz 1943
Schwartz and Mitchell 1945
Shantz 1940
Shantz 1940a
Shantz 1941
Sheldon 1927
Shoemaker 1930
Skinner 1950
Skinner 1950a
Smith 1958
Standing 1931
Swank 1955
*Szederjei 1957
*Taber 1961
Tanner 1965
Thomas 1965
Townsend 1957
*Vasic 1959
*Vinson 1947
Wasem 1963
*Whitehead 1950
*Wodzicki 1961
Yorgason 1964
Yorgason 1966

HABITAT MANAGEMENT

Leege 1967
Lyon 1966

MORTALITY

*Abramov 1959
Allred 1944
Buechner and Swanson 1955
Carpenter 1921

Couey 1947
Horn 1960
*Ueckerman 1964
U.S. Dept. of the Interior 1892

MOVEMENTS AND MIGRATIONS

Allred 1950
Altmann 1956
Anderson 1954
Bendt and Anderson 1958
Blunt 1950
Boyd 1965
Boyd 1966
Brazda 1953
Cole 1964
Cole and Yorgason 1963
1964
1966
Dalke, Beerman, Kindel, Robel and Williams 1965
Denney 1965
Ellis 1965
Forest and Stream 1884
1887
Gill 1967
Harper 1964
Jackson 1941
Janson 1962-1968
Janson 1966
*Lowe 1966
Martinka 1965
*Melichar 1960
Moran 1967
Picton 1959
Picton 1960a
Robel 1960
Robel 1960a
Rouse 1957
Sharitt 1946
Shaw and Casebeer 1942
Sheldon, Murie and Crouch 1935
Skinner 1925
Sparks 1963
Zajanac and Brandborg 1948

PARASITES AND DISEASES

Adcock, Hibler, Abdelbaki and Davis 1965
Alderson 1949
Allred 1944
Anderson, Lankester and Strelive 1966
Anonymous 1945
Barrett and Worley 1965
*Blazek, Dykova and Pav 1968
Cass 1947
Claus 1962
Cohenour 1917
Corner and Connell 1958
Corson and Pawling 1927
Cowan 1948
Cowan 1951
*Daniel 1966
Davis and Abdelbaki 1964
Davis, Abdelbaki and Adcock 1965
Davis, Abdelbaki, Adcock and Hibler 1966
DeNio and West 1941
Denney 1964
Denney 1965
Drake 1951
*Drozdz 1966
*Dunn 1960
*Enigk and Friedhoff 1963
Erling 1957
Eveleth and Bolin 1955
Gallizioli 1961
Gallizioli 1963
Green 1949
Grobov 1961
*Guildal 1962
Hall 1929
Hall 1930
Hepworth 1964
Hepworth and Thomas 1962
Hibler and Adcock 1968
Honess 1955
Honess and Winter 1965
Howe 1964
Howe 1965
Howe 1965a
Howe 1965b
Howe and Hepworth 1966
Howell 1940
*Jensen 1960
*Mambetzhumaev 1961
McBee 1962
McBee 1964
Mills 1936
*Morozov 1958
Mott and Manthei 1956
Murie 1930
Murie, Allred and Brown 1944
*Osipov 1966
*Petrovic, Bordoski, Popovic 1966
Post 1958a
Presidente 1968
Rich 1957
Rush 1932
Rush 1932a
Smith and Davis 1968
Stelfox 1962
*Terlecki, Done and Clegg 1964
Tunnicliff and Marsh 1935
White 1957-1960
Worley and Barrett 1964
Worley, Jacobson and Greer 1968
*Zadura 1960

PHYSICAL CHARACTERISTICS

Age

Denney 1957
Denney 1958
Flook 1967
Greer 1966
Greer and Yeager 1967
1967a
Haugen 1966
*Lowe 1967
Martinka 1965
*Mitchell 1963
*Mitchell 1967
Murphy 1963
Quimby and Gaab 1953
1957
Swanson 1951

Anatomy

Cahalane 1939b
Fladmark 1934
*Gray 1836
Greer and Hawkins 1967
Hall and Miller 1933
*Hofmann 1961
*Mitchell 1965
*Popovic 1964
*Riney 1955
*Riney 1955a
*Riney 1960
*Ruprecht 1965
*Strahl 1906

Antlers

Altsheler 1908
American Sportsman 1872
1873
1874
Anderson 1965
Antony 1929
Antony and Harriman 1939
Arnold 1930
Baillie-Graham 1900
*Bergengren 1956
Bird 1933
Boone and Crockett Club, Committee on Records 1958
Bradley 1966
Brown 1921
*Bubenik 1966
*Bubenik and Mumkacevic 1966
*Bubenick, Pavlansky and Rerabek 1956
Buss and Solf 1959
*Clarke 1866
*Erdbringk 1964
*Frankenberger 1955
*Freund 1955
Frick 1937
Goodwin 1940
Hawthorn and Duckworth 1958
Hollister 1920
Hudson 1950
*Huxley 1926
*Huxley 1931
*Huxley 1932
*Jaczewski 1956
*Jaczewski 1961
*Jaczewski, Zurowski and Zaniewski 1962
Knight 1856
*Lojda 1956
*Lydekker and Burlace 1914
Moore 1931
*Munkacevic 1964
Murie 1963
*Pantic 1966
*Philipowicz 1961
*Rerabek and Bubenik 1956
*Reiabek and Bubenik 1963
*Reichstein 1966
*Reinders 1960
Robinette, Leslie and Jones 1959
Sanborn 1929
*Shikama 1964
Shikama 1964a
Skinner 1920
Skinner 1921
Skinner 1921a
*Szunyoghy 1959
Taber 1958
*Ward 1910
West 1941
White 1958
*Winans 1913

Nutrition

Bandy, Cowan, Knitts and Wood 1956
Boll 1958
*Bonnemann 1957
*Bubenik and Lochman 1956
*Bubenik, Lochman and Prusek 1956
*Caesar 1956
*Gill 1961
*Gill and Jaczewski 1958
Greer 1968
Herin and Denney 1965
*Popovic 1964
Preble 1911
*Riney 1955
*Riney 1960
Thorne 1968
*Ueckermann 1955
*Ueckermann 1956
*Valentincic 1959

Osteology

*Ahlen 1965
*Beme 1957
Gilbert and Hill 1956
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*Jablan-Pantic and Brna 1966
Knight 1966
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*Mystkowska 1966
Nordquist 1941
*Pekelharing 1968
*Szaniawski 1966

Physiology

*Brockway and Maloiy 1968
*Brown 1925
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*Christie 1967
Denney 1965
Floed 1928
*Frankenberger 1955
*Freundova 1955
*Goodall, Kay and Maloiy 1968
*Gill 1961
*Gizenko 1963
Greer 1968
Greer and Picton 1964
Hanson, Dahl, Whicker, Flyger, Longhurst, Davey and Greer 1963
Herin 1968
*Huxley 1932
*Jaczewski and Gill 1958
*Jaczewski, Zurowski and Zaniewski 1962
McBee 1964
Mills 1935
*Munkacevic 1964
*Mystkowska 1966
*Pantic 1966
*Rerabek and Bubenik 1956
*Rerabek and Bubenik 1963
Skinner 1923
*Ueckermann 1956
Whicker, Farris and Dahl 1966
Winter and Honess 1952

Size

Boyd 1965
Boyd 1966
*Brna 1964
*Daniel and Kershaw 1964
Gill and Jaczewski 1958
*Valentincic 1958
*Walvius 1961

Weights

*Bouvier 1963
Blood and Lovaas 1966
*Caesar 1956
*Gill and Jaczewski 1958
Greer 1965
Greer 1965a
Greer and Howe 1964
*Kroning and Vorreyer 1957
*Mystkowska 1966
Quimby and Johnson 1951
*Reinders 1960
Skinner 1946
Skinner 1946a
*Szunyoghy 1959
Troyer 1960
Wright 1956

POPULATIONS

Amaral 1964
Buttery 1956
Crawford 1926
*DeCrombrugghe 1964
*Eygenraam 1960
Fashingbauer 1965
*Kaznevskii 1963
*Mitchell 1965
O'Claire 1949
Parsell 1938
Pengelly 1960
Pengelly 1963
Rasmussen 1949
Reese 1944
Rognrud 1953
Rush 1940
Scheffer and Bond 1946
Seton 1898
Sheldon, Murie and Crouch 1935
Shoemaker 1930
Stelfox 1964
Taber 1963
Tanner 1965
U.S. Dept. of the Interior 1892
*Valentincic 1958
Walsh 1946
*Webb 1960

PREDATION

Brooks 1926
Cahalane 1939
Cahalane 1943
Cottrell 1928
Green 1951
Hornocker 1967
Murie 1940
Robinson 1952

PUBLIC LAND

Renner 1938

RANGE USE

Barmore 1965
Barmore 1967
Bettle 1952
Bentley 1959
Blades 1936
Boyd 1965
Boyd 1965a
Buechner 1952
Buechner and Whittaker 1954
Buttery 1956
Cahalane 1943
Casebeer 1961
Christensen 1968
Cole 1957
Cooney 1948
Cooney 1950
Cooney 1951
Cooney and Redman 1934
Couey 1946
Couey 1947
Cowan 1950
Croft and Lincoln 1960
Denney 1962
Egan 1967-1968
Elrod 1926
Eustace 1967
Forest and Stream
1885
1886
1887
1908
1910
Gammill 1941
Grimm 1939
Gysel 1960
Harris 1958
Hatch 1937
Hinkley 1937
Hodder 1955
Hodder and Gaab 1949
Hoskins and Dalke 1955
Hough 1894
Howard 1934
Howard 1936
Howard 1937
Hunter 1945
Jeffrey 1963
Jones 1965
Jonkel 1959-1964
Julander, Odell and Jeffrey 1964
Julander, Robinette, Smith and Gaufin 1950
Kirsch 1962
Kirsch 1963
Kittams 1958
Kittams 1959
Leege and Hickey 1967
Leek 1925
Lovaas 1962-1965
Mackie 1961
Mackie 1965
McCulloch 1955
McDowell 1942
McMillan 1953
Mitchell 1941
Mitchell 1950
Mitchell 1951
Mitchell and Cormack 1960
Moir 1943
Morrison 1960
Murie 1944
Murie 1945
Norberg and Trout 1958
Packer 1963
Pehrson 1968
Pickford and Reid 1943
Picton 1959
Rasmussen 1949
Ratcliff 1941
Renner 1938
Reynolds 1964
Rognrud 1953
Rouse 1957
*Rusanov 1963
*Sablina 1959
*Schulz 1960
Schwan and Swift 1941
Schwartz 1943
Schwartz and Mitchell 1945
Shaw and Casebeer 1942
Sheldon, Murie and Crouch 1935
Shelford 1937
Shepherd 1962
Shoemaker 1928
Shoemaker 1930
Skinner 1936
Smith 1958
Stevens 1965
Stevens 1966
Swift 1941
Townsend 1957-1960
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*Anderson 1965
*Bartram 1967
Batchelor 1963
Blunt 1959
Brown 1936
*Bubenik 1966
Buechner and Swanson 1955
*Burckhardt, Kuster and Schloeth 1961
Burt and Gates 1959
Cheatum and Gaab 1952
Cheatum and Gaab 1952a
Coffin and Remington 1953
Conaway 1952

*Daniel 1963
*DeCrombrugghe 1964
DeVos, Brokx and Geist 1967
*Douglas 1966
*Dubajic 1964
*Eygenraam 1962
*Eygenraam 1963
Floed 1928
*Frankenberger 1953
*Freund 1955
*Freundova 1955
Glover 1953
Greer 1965
Greer 1966
Greer and Hawkins 1967
Greer, Hawkins and Catlin 1968
Halazon and Buechner 1956
*Hamilton, Harrison and Young 1960
Hancock 1957
Haugen 1966
*Jablan-Pantic and Brna 1966
Kittams 1953
*Kroning and Vorreyer 1957
Miers 1962
Mills 1936
Morrison 1957
Morrison 1960
Morrison 1960a
Morrison, Trainer and Wright 1959
Murie 1944
Rognrud 1953
Saunders 1955
Standing 1931
*Strahl 1906
Struhsaker 1967
Thorne 1968
Trainer 1968
*Valentincic 1958
*Valentincic 1959
West 1941
*Winans 1913

SALTING

Anderson and West 1941
Beeman 1957
Beeman 1957a
Case 1937
Case 1938
Case 1938a
Cooney 1951
Cooney 1951a
Cowan and Brink 1949
Dalke, Beeman, Kindel, Robel and Williams 1965
Gallaher 1938
Kindel 1958
Knight and Mudge 1967
Robel 1958
Rognrud 1955
Rognrud 1955a
Williams 1962

SURVEYS AND INVENTORIES

Batchelor 1963
Boyd 1963
Boyd 1965
Brown 1954
Casagranda 1958
Casagranda, Picton and Janson 1959
Cooney 1940
Cooney 1946
Cooney and Howard 1935
Dalke 1968
Denney 1961
Ellig 1956-1961
Ellis 1949
Foss 1965-1968
Gaab 1948-1949
Gaab 1952
Guse, Rice, Carr, and Denney 1964
Hartkorn 1956-1967
Hodder 1955
Jackson 1944
*Mitchell 1965
Norberg 1956
Peek 1966-1967
*Riney 1957
Rognrud 1956-1961
Rothweiler 1965
Ryel and Bennett, Jr. 1966
S. M. B. 1955
Schneider 1947
Trueblood 1956-1968
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White 1958

TAXONOMY

*Ahlem 1965
American Sportsman 1872
Anonymous 1799
Bailey 1935
Bailey 1937
Barnes 1927
Billings 1856
*Brooks 1878
Cuvier 1827
Dasmann 1965
DeKay 1842
Dice 1937
*Dubajic 1964
Fisher 1934
Forest and Stream 1874
Gilmore 1947
Godman 1826
Godman 1828
Goodwin 1940
*Gray 1836
Guthrie 1966
Harlan 1825
Lederer 1672
*Lukaszewics 1966
Matthew 1908b
Matthew 1934
Miller and Kellog 1955
Mohr 1955
Nelson 1902
*Philipowicz 1961
Smith 1798
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1931
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Denney 1957
Denney 1958
Denney 1964c
Denney 1965b
Ellis 1965
Flook, Robertson, Hermanrude, and Buechner 1962
Geis 1954
Gerasimov 1963
Halazon and Buechner 1956
Hancock and Low 1956
Helwig 1957
*Henderson 1960
Hodder 1953
Hungerford 1952
Keiss and Morrison 1956
Lovaas, Egan, and Knight 1966
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Merriam 1921
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Morris, et. al. 1958
Morris and Hungerford 1952
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*Rerabek and Bubenik 1956
*Rerabek and Bubenik 1963
*Riney 1955
*Riney 1960

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Allred 1950
Altmann and Simon 1952
Anderson 1953
Barnes 1925
*Boch, Nerl, Hobl and Feig 1961
Boyd 1961
Boyd 1964
Boyd 1965
Boyd 1965a
Boyd 1966
Boyd 1967
Brown 1954
Brown 1955
Brown, and Matensen 1954
Casagranda 1958
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Cramer 1939
Denney 1965
Denney 1965a
Denney 1966
Denney 1966a
Denney 1966b
Harper 1964
Harper 1965
Harper and Lightfoot 1966
Harper and Lightfoot 1966a
Hess 1966
Hinman 1963
Howe 1966
Howe, R. E. 1963
*Jewell and Lowe 1965
Knight 1966
Mobley 1963
Miner 1952
Post 1959
Prenzlow 1967
*Schloeth, Klinger and Burkhardt 1960
Snyder 1965
Straley 1960
*Taylor and Magnussen 1965
*Taylor and Magnussen 1967
Van Reuss 1966

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Kindel 1960
McConnell 1967
Neff, Wallmo and Morrison 1965
Reynolds 1962
*Riney 1957
Robinette, Ferguson and Gashwiler 1958

TRANSPLANTING

*Bentley 1957
Bump 1940
Couch 1935a
Dalke and Spencer 1944
*DeVos, Manville and Van Gelder 1956
Dow 1934
Dresskell 1962
Fashinbauer 1965
Fisher 1937
Forest and Stream 1914
Holloran 1963
*Howard 1964
Kartchner 1940
*Logan and Harris 1967
Montana 1950
Murie 1940
Murie 1951
Poole 1951
*Presnall 1958
*Riney 1956
Ruhl 1940
Stelfox 1964
Swanson 1940
*Valentincic 1958
*Vinson 1947
Wilhelm 1967
*Wodzicki 1952
*Wodzicki 1963

YELLOWSTONE NATIONAL PARK HERDS

Anonymous 1927
Anonymous 1967
Barmore 1967
Chittenden 1915
Cook, Folsom and Peterson 1965
Greer 1962-1967
Hamilton ——
Hornaday 1913
Mills 1937
Olsen 1968
Randall 1961
Richard 1968
Rush 1932b
Rush 1933
Russell 1933
Russell and Voth 1940
Skinner 1921
Skinner 1922
Skinner 1925
Skinner 1929
Sportsmen's Review 1917
Squier 1924
Stray 1923
Trefethen 1961
U.S. Congress, House of Representative's Hearing 1962
U.S. Congress, House of Representative's Report 1928
U.S. Congress, Senate Hearings 1967
U.S. Congress, Senate Reports 1928
Yount 1881

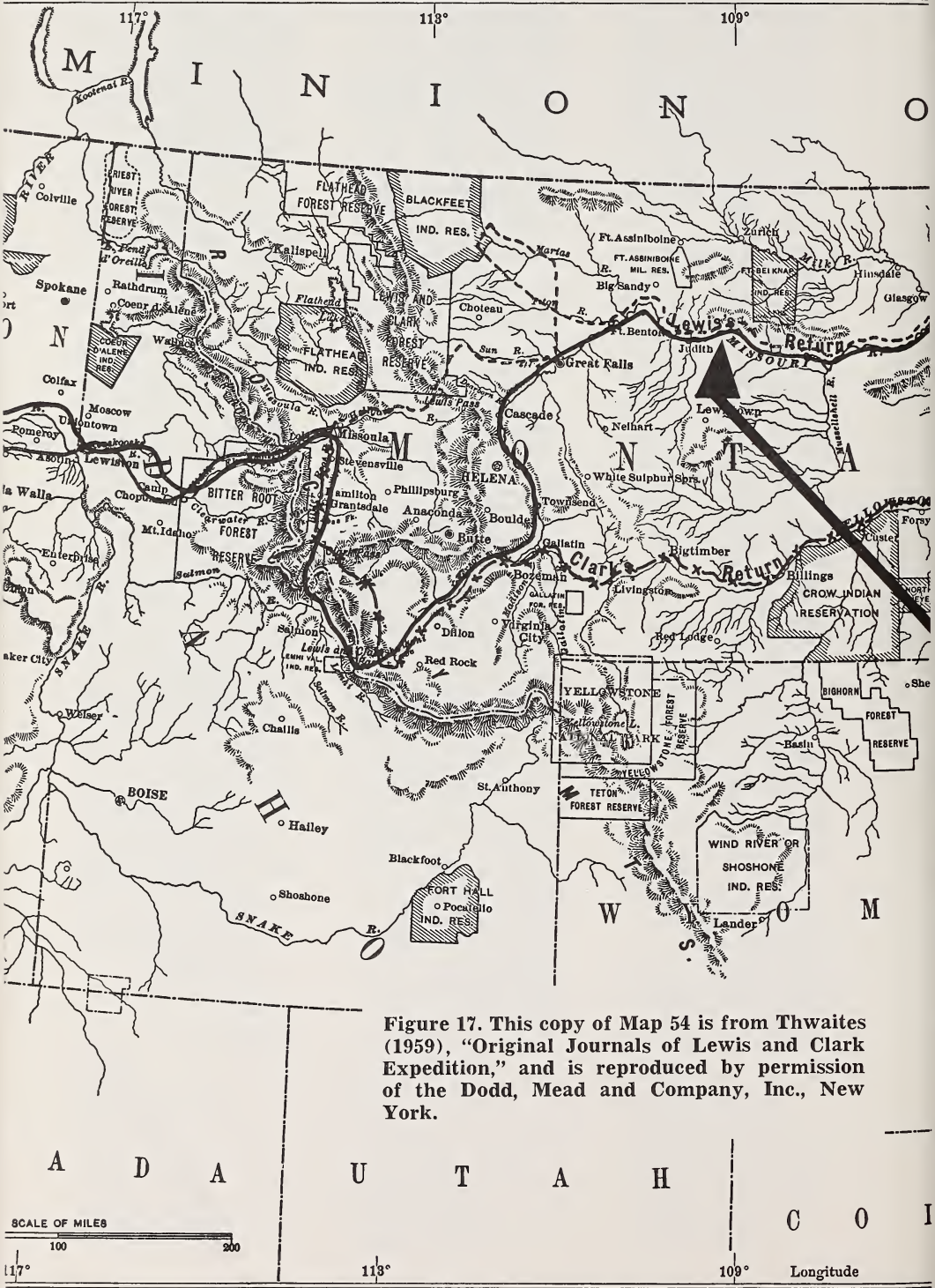
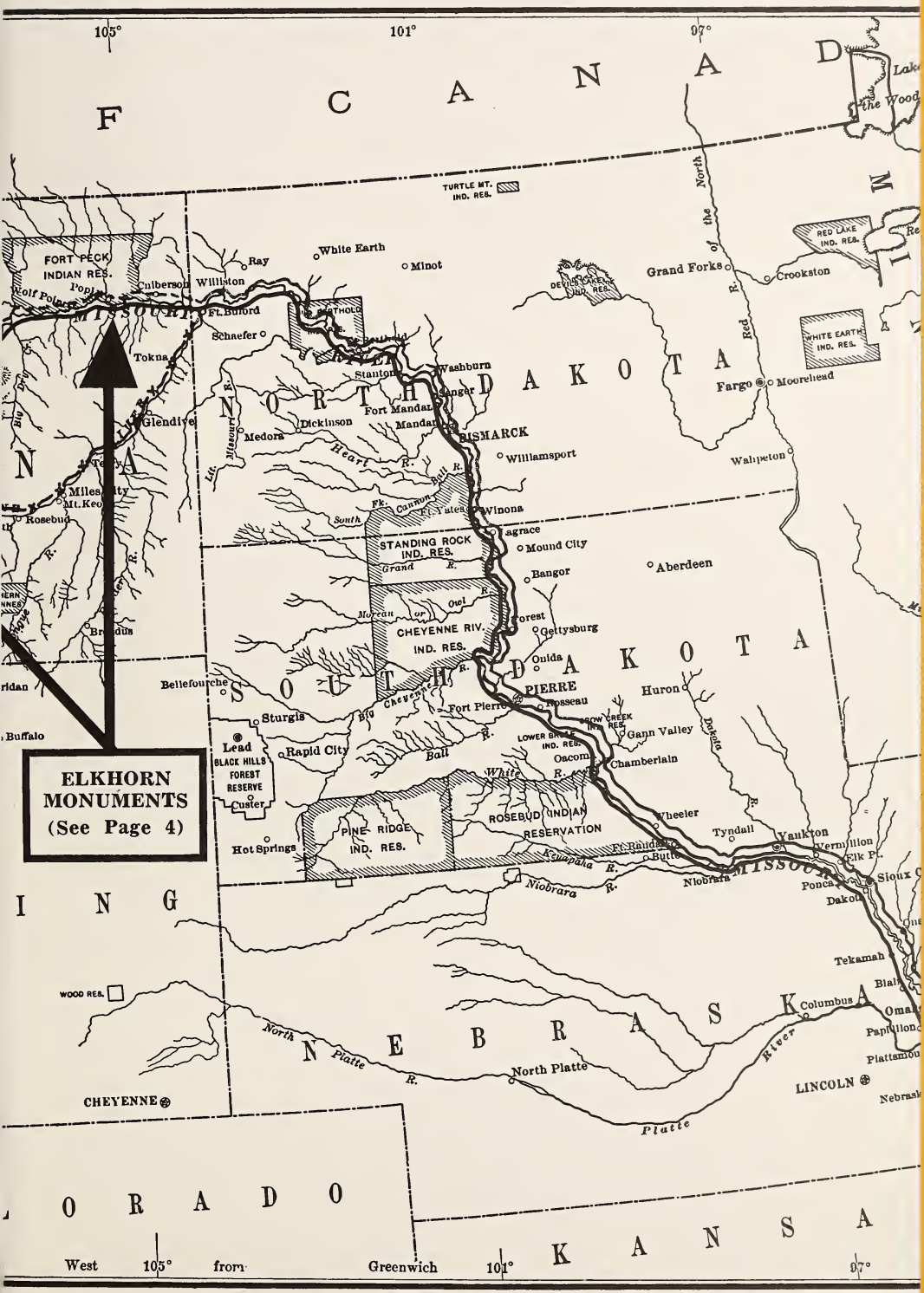


Figure 17. This copy of Map 54 is from Thwaites (1959), "Original Journals of Lewis and Clark Expedition," and is reproduced by permission of the Dodd, Mead and Company, Inc., New York.


105°
101°
97°
CANADA
Lake of the Woods
TURTLE MT. IND. RES.
FORT PECK INDIAN RES.
Wolf Point
Poplar
Culbertson
Williston
Ray
White Earth
Minot
Grand Forks
Crookston
RED LAKE IND. RES.
DEVILS LAKE IND. RES.
WHITE EARTH IND. RES.
Ft. Buford
Schaefer
Tokna
Glendive
Washburn
Stanton
Fort Mandan
Mandan
BISMARCK
Fargo
Moorehead
Medora
Dickinson
Williamsport
Wahpeton
Miles City
Mt. Keo
Rosebud
Winona
Yatesa
STANDING ROCK IND. RES.
Mound City
Aberdeen
Bangor
Forest
Gettysburg
CHEYENNE RIV. IND. RES.
Onida
PIERRE
Fort Pierre
Rosseau
Huron
Bellefourche
Sturgis
Rapid City
Lead
BLACK HILLS FOREST RESERVE
Custer
LOWER BRULE IND. RES.
CROW CREEK IND. RES.
Gann Valley
Oacoma
Chamberlain
Wheeler
ROSEBUD INDIAN RESERVATION
PINE RIDGE IND. RES.
Hot Springs
Tyndall
Yankton
Vermillion
Elk Pt.
Sioux
Ponca
Niobrara
Tekamah
Columbus
Papillion
Plattsmouth
LINCOLN
Nebraska
North Platte
CHEYENNE
WOOD RES.
ELKHORN MONUMENTS (See Page 4)
West 105° from Greenwich 101° 97°

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